

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
22 September 2005 (22.09.2005)

PCT

(10) International Publication Number
WO 2005/088741 A1

(51) International Patent Classification⁷: **H01L 33/00**

(21) International Application Number:
PCT/KR2005/000036

(22) International Filing Date: 7 January 2005 (07.01.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10-2004-0018139 17 March 2004 (17.03.2004) KR

(71) Applicant (for all designated States except US): **OP-TOWAY, Inc.** [KR/KR]; 1683-2 Sinil-dong, Daeduck-gu, Daejeon 306-230 (KR).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CHOI, Pun Jae** [KR/KR]; 203-1101 Hansol Apt., Songgang-dong, Yuseong-gu, Daejeon 305-758 (KR). **PARK, Jin Soo** [KR/KR]; 629 Beonji, Deongnim-ri, Jusan-myeon, Buan-gun, Jeollabuk-do 579-922 (KR). **KIM, Seong Han** [KR/KR]; 204-303 Hansol Apt., Songgang-dong, Yuseong-gu, Daejeon 305-758 (KR). **GONG, Myeong**

Kook [KR/KR]; 901-2003 LG-XI Apt., 869 Beonji, Sanghyeon-dong, Yongin, Gyeonggi-do 449-529 (KR). **CHO, Hyeon Ryong** [KR/KR]; 523-908 5 Danji Jugong Apt., Maetan 1-dong, Paldal-gu, Suwon, Gyeonggi-do 443-709 (KR).

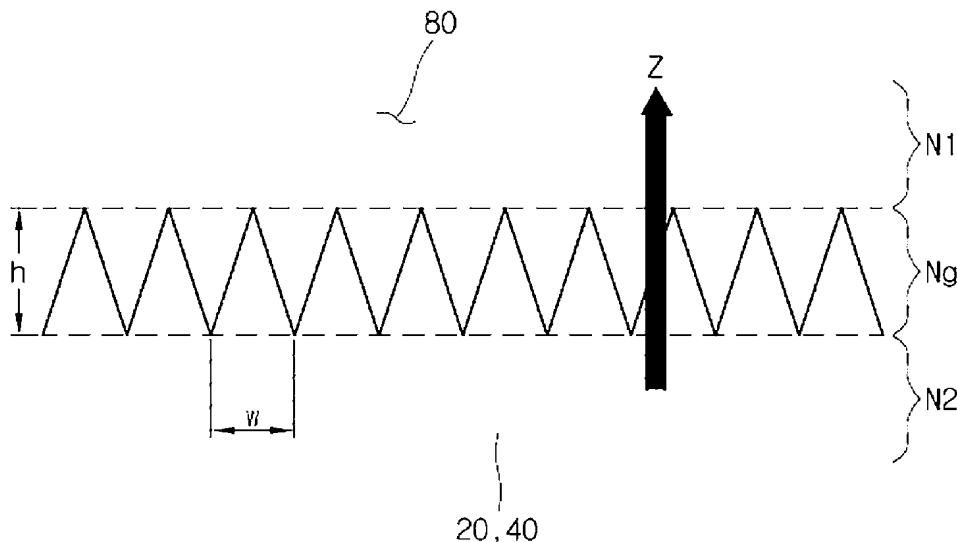
(74) Agent: **JIN, Yong Suk**; 513, Cheongsa Office Building, 915, Beonji, Dunsan-dong, Seo-gu, Daejeon 302-120 (KR).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,

[Continued on next page]

(54) Title: ANTI-REFLECTED HIGH EFFICIENCY LIGHT EMITTING DIODE DEVICE



(57) Abstract: The present invention is related to a light emitting diode device in which a fine prominence and depression is formed on a semiconductor layer to make an anti-reflection region. The light emitting diode device comprises, a substrate; a N-type semiconductor layer; an active layer for generating light; P-type semiconductor layer; a first exposed region formed by etching the active layer and the P-type semiconductor layer to partly expose the N-type semiconductor layer; a first ohmic contact formed on the first exposed layer; a second ohmic contact formed on the P-type semiconductor layer, and having an opening to partly form a second exposed region on the P-type semiconductor layer, said second exposed layer being formed to partly have a ultra-fine prominence and depression.

WO 2005/088741 A1



ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *with international search report*